

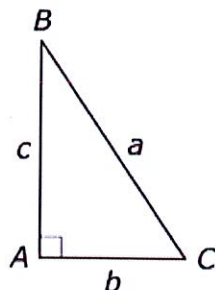
Name: ANSWER KEY

Date: \_\_\_\_\_

Per.: \_\_\_\_\_

Trigonometry PARCC Problem Set

10. The figure shows right  $\triangle ABC$ .



Which of the listed values are equal to the sine of  $B$ ?

$\frac{\text{opp}}{\text{hyp}}$

Select **all** that apply.

☒ A.  $\frac{b}{c}$   $b$  is opp. but  $c$  is adj. NOT hyp.

☒ B.  $\frac{c}{a}$   $\frac{\text{adj}}{\text{hyp}}$ . (this would be cosine)

☒ C.  $\frac{b}{a}$

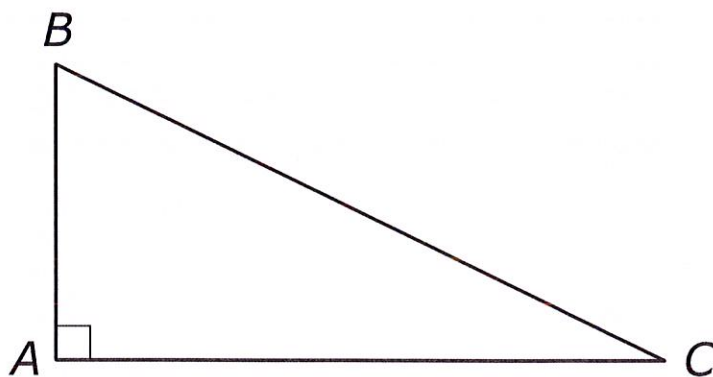
☒ D. the cosine of  $B$   $\frac{c}{a}$  NOT  $\frac{b}{a}$

☒ E. the cosine of  $C$  also  $\frac{b}{a}$

☐ F. the cosine of  $(90^\circ - B)$   $90^\circ - B = C!$   $\cos C = \sin B$

☐ G. the sine of  $(90^\circ - C)$   $90^\circ - C = B!$   $\sin B$

②



In right triangle  $ABC$ ,  $m\angle B \neq m\angle C$ . Let  $\sin B = r$  and  $\cos B = s$ . What is  $\sin C - \cos C$ ?

A.  $r + s$

B.  $r - s$

C.  $s - r$

D.  $\frac{r}{s}$

$$\begin{aligned} \sin B &= \cos C & \text{If } \sin B = r, \cos C = r \\ \cos B &= \sin C & \text{If } \cos B = s, \sin C = s \end{aligned}$$

$$\begin{aligned} \sin C - \cos C \\ s - r \end{aligned}$$

③ The degree measure of an angle in a right triangle is  $x$ , and  $\sin x = \frac{1}{3}$ .

Which of these expressions are also equal to  $\frac{1}{3}$ ?

Select **all** that apply.

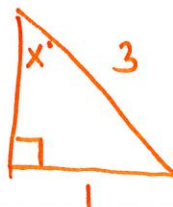
☒ A.  $\cos(x)$

☒ B.  $\cos(x - 45^\circ)$

☒ C.  $\cos(45^\circ - x)$

☒ D.  $\cos(60^\circ - x)$

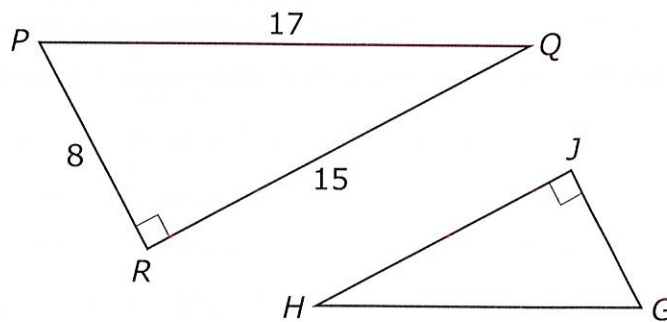
☒ E.  $\cos(90^\circ - x)$



\* these are not necessarily the side lengths but the diagram will help!

$$\begin{aligned}\angle G &\rightarrow \angle P \\ \angle H &\rightarrow \angle Q \\ \angle J &\rightarrow \angle R\end{aligned}$$

- 4 In this figure, triangle  $GHJ$  is similar to triangle  $PQR$ .



$$\begin{aligned}\overline{GH} &\rightarrow \overline{PQ} \\ \overline{HJ} &\rightarrow \overline{QR} \\ \overline{GJ} &\rightarrow \overline{PR}\end{aligned}$$

Based on this information, which ratio represents  $\tan H$ ?

(A)  $\frac{8}{15}$

$$\tan H = \frac{JG}{HJ}$$

(B)  $\frac{8}{17}$

This will be the same as

(C)  $\frac{15}{8}$

$$\tan Q = \frac{8}{15}$$

(D)  $\frac{17}{8}$

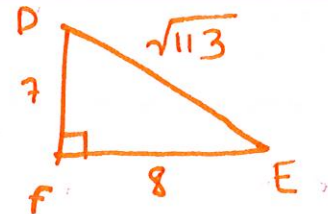
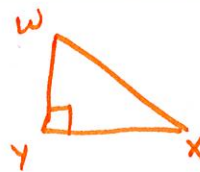
- 5 Right triangle  $WXY$  is similar to triangle  $DEF$ . The following are measurements in right triangle  $DEF$ :

$$m\angle F = 90^\circ$$

$$DE = \sqrt{113}$$

$$DF = 7$$

$$EF = 8$$



Which expression represents  $\cos W$ ?

(A)  $\cos W = \frac{7}{\sqrt{113}}$

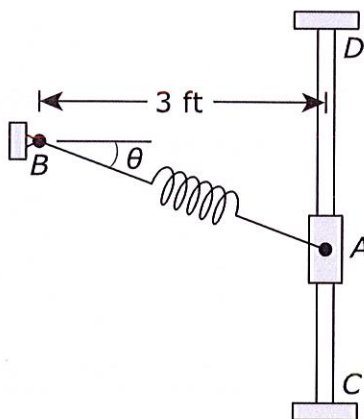
(A is correct, not B)

(B)  $\cos W = \frac{8}{\sqrt{113}}$

(C)  $\cos W = 7\sqrt{113}$

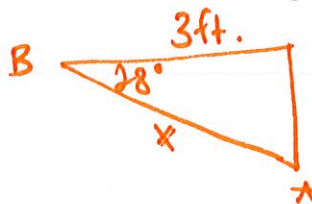
(D)  $\cos W = 8\sqrt{113}$

- 6 A spring is attached at one end to support  $B$  and at the other end to collar  $A$ , as represented in the figure. Collar  $A$  slides along the vertical bar between points  $C$  and  $D$ . In the figure, the angle  $\theta$  is the angle created as the collar moves between points  $C$  and  $D$ .



**Part A**

When  $\theta = 28^\circ$ , what is the distance from point  $A$  to point  $B$  to the nearest tenth of a foot?



$$\cos 28^\circ = \frac{3}{x}$$

$$x = 3.4 \text{ ft.}$$

**Part B**

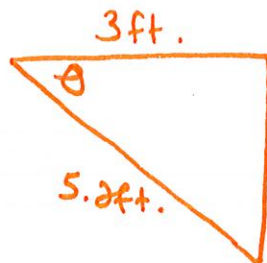
When the spring is stretched and the distance from point  $A$  to point  $B$  is 5.2 feet, what is the value of  $\theta$  to the nearest tenth of a degree?

A.  $35.2^\circ$

B.  $45.1^\circ$

C.  $54.8^\circ$

D.  $60.0^\circ$



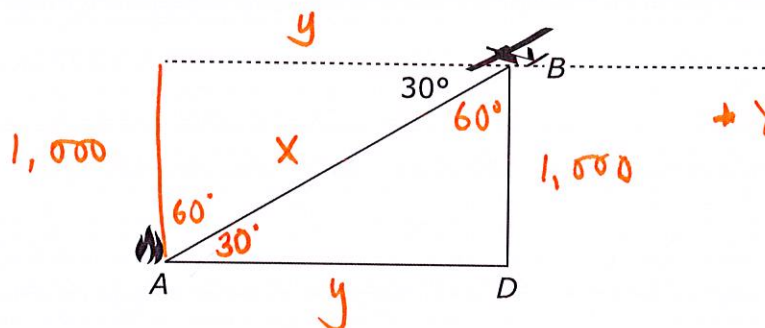
$$\cos \theta = \frac{3}{5.2}$$

$$\theta = \cos^{-1} \left( \frac{3}{5.2} \right)$$

$$\theta = 54.8^\circ$$

7

An unmanned aerial vehicle (UAV) is equipped with cameras used to monitor forest fires. The figure represents a moment in time at which a UAV, at point  $B$ , flying at an altitude of 1,000 meters (m) is directly above point  $D$  on the forest floor. Point  $A$  represents the location of a small fire on the forest floor.



\* You do not need to fill in all of this information but I wanted you to see your options.

At the moment in time represented by the figure, the angle of depression from the UAV to the fire has a measure of  $30^\circ$ .

### 23. Part A

At the moment in time represented by the figure, what is the distance from the UAV to the fire? (x)

Enter your answer in the box.

### Part B (y)

What is the distance, to the nearest meter, from the fire to point  $D$ ?

Enter your answer in the box.

$$A. \sin 30^\circ = \frac{1000}{x}$$

$$x = 2,000 \text{ m}$$

$$B. \tan 30^\circ = \frac{1000}{y}$$

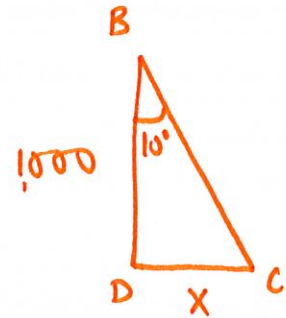
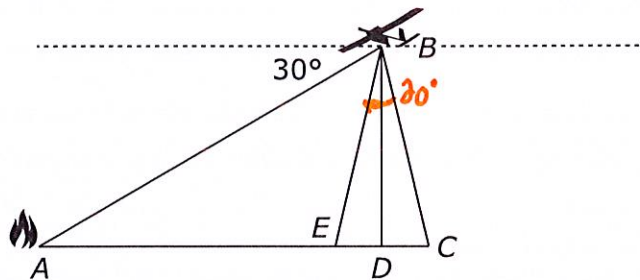
$$y = 1,732 \text{ m}$$

It is best NOT to use the hypotenuse in your ratio in case you make a calculation error in Part A.



**Part C**

Points  $C$  and  $E$  represent the linear range of view of the camera when it is pointed directly down at point  $D$ .



The field of view of the camera is  $20^\circ$  and is represented in the figure by  $\angle CBE$ . If the camera takes a picture directly over point  $D$ , what is the approximate width of the forest floor that will be captured in the picture?

- A. 170 meters
- B. 353 meters**
- C. 364 meters
- D. 728 meters

$$\tan 10^\circ = \frac{X}{1000}$$

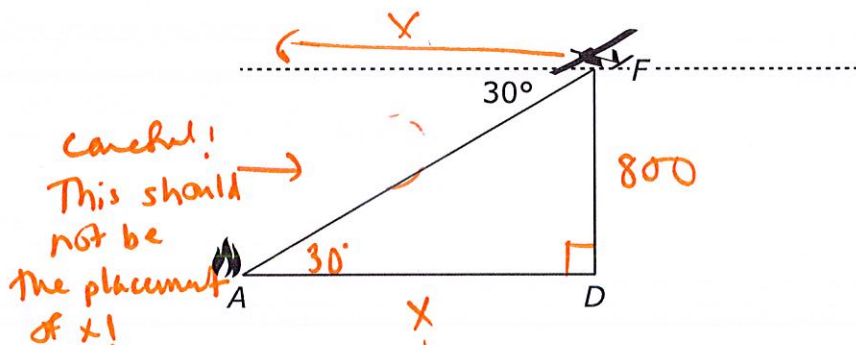
$$X = 176.327$$

This will be doubled!

$DC$  is only half the range of view.

**Part D**

The UAV is flying at a speed of 13 meters per second in the direction toward the fire. Suppose the altitude of the UAV is now 800 meters. The new position is represented at  $F$  in the figure.



From its position at point  $F$ , how many minutes, to the nearest tenth of a minute, will it take the UAV to be directly over the fire?

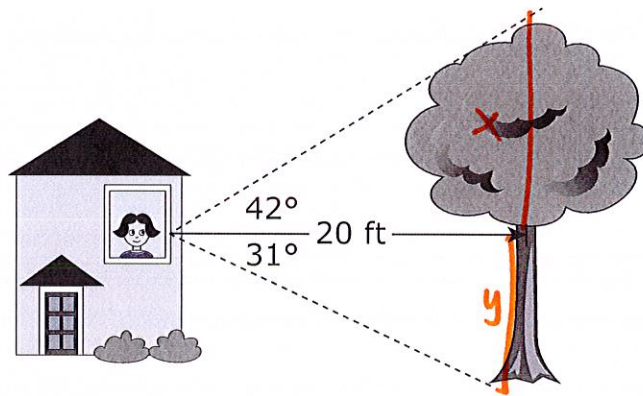
- A. 0.6
- B. 1.2
- C. 1.8**
- D. 2.0

$$\tan 30^\circ = \frac{800}{X}$$

$$X = 1,385.64 \text{ m} \div 13 \text{ m/s} = 106.59 \text{ seconds}$$

$$106.59 \text{ s} \div 60 = 1.8 \text{ minutes}$$

- 8 Mariela is standing in a building and looking out of a window at a tree. The tree is 20 feet away from Mariela. Mariela's line of sight to the top of the tree creates a  $42^\circ$  angle of elevation, and her line of sight to the base of the tree creates a  $31^\circ$  angle of depression.



What is the height, in feet, of the tree?

$$\tan 42^\circ = \frac{x}{20}$$

$$x = 18$$

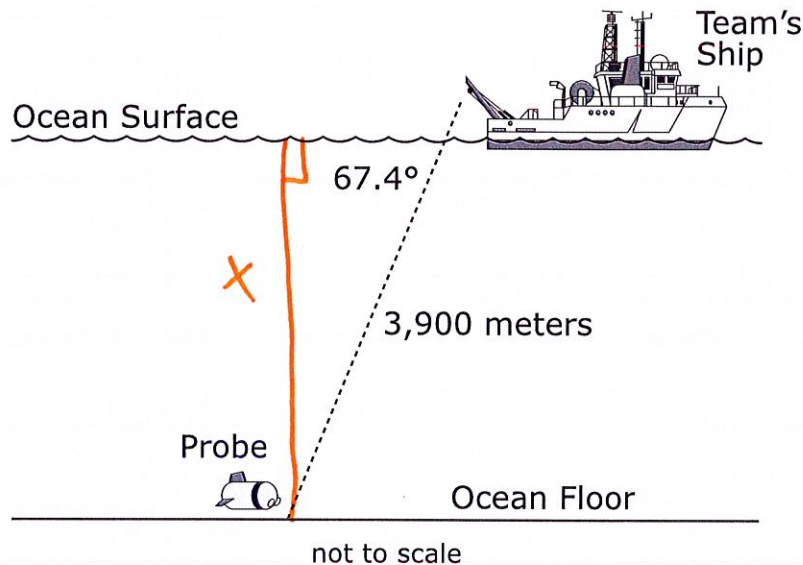
$$18 + 12 = 30 \text{ ft}$$

$$\tan 31^\circ = \frac{y}{20}$$

$$y = 12$$

9

An archaeological team is excavating artifacts from a sunken merchant vessel on the ocean floor. To assist the team, a robotic probe is used remotely. The probe travels approximately 3,900 meters at an angle of depression of 67.4 degrees from the team's ship on the ocean surface down to the sunken vessel on the ocean floor. The figure shows a representation of the team's ship and the probe.



How many meters below the surface of the ocean will the probe be when it reaches the ocean floor?

Give your answer to the nearest hundred meters. Enter your answer in the box.

$$\sin 67.4^\circ = \frac{X}{3900}$$

$$X = 3,600 \text{ m}$$